

TSX-Plus  
Installation Guide

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This guide describes the installation of TSX-Plus Version 5.0

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## 1. Introduction

The purpose of this guide is to help you install TSX-Plus on your system in the quickest and easiest way possible. Read this entire guide before attempting to install or use TSX-Plus. This guide describes the contents of a typical distribution kit, necessary system resources, the circumstances that require a TSX-Plus system generation, and the short-cut procedure for installing a functional version of TSX-Plus. The new TSX-Plus user should follow the short-cut path to verify that all the components of the system are working together correctly and to obtain some experience with TSX-Plus before tailoring TSX-Plus to the peculiarities and needs of a particular site. The experienced TSX-Plus user may proceed directly to the TSX-Plus System Manager's Guide for detailed instructions on performing the TSX-Plus system generation process.

This guide is intended for the person installing TSX-Plus and assumes some familiarity with the commands and utilities of RT-11, including: handling of magnetic media; use of command files; the COPY and PRINT commands; use of one of the system editors (KED, EDIT, or TECO); assembling and linking a pre-written MACRO program; and the R[UN] command. It is not necessary to be able to write MACRO programs, but you should be familiar with the assembly and linking process. If you elect to perform a TSX-Plus system generation, it is also useful to be familiar with the usage of comments, labels and parameters in MACRO programs. It is necessary to have access to configuration information about the various peripheral devices attached to your computer, especially to know what device handlers are needed and what vectors and addresses are used by these devices and by timesharing terminals. This configuration information should have been written down and left with the system by the person who installed the hardware. If it is not available, ask the person who installed the hardware to enter the configuration information for your system in the form in Appendix D of the TSX-Plus System Manager's Guide.

The TSX-Plus operating system is designed to provide the familiar RT-11 operating environment to multiple users. This goal mandates several extensions to the command language of RT-11, and makes a few features unavailable. The TSX-Plus Reference Manual describes all of the functional differences between RT-11 and TSX-Plus, including additional keyboard commands and other features, unsupported commands and other features, and other minor variations between the two operating systems. The TSX-Plus manuals are intended to be used in conjunction with the RT-11 manuals; refer to the RT-11 manuals for descriptions of features which are not discussed in the TSX-Plus Reference Manual.





## 2. Distribution Kit Contents

With each new order of a fully supported TSX-Plus operating system, you should receive:

1. Installation guide - this is it.
2. A machine readable medium containing the components of the TSX-Plus operating system - this may be a reversible single density diskette, an RL01 or RL02 disk, or magnetic tape.
3. TSX-Plus Reference Manual and TSX-Plus System Manager's Guide.





### 3. System Prerequisites

#### 3.1. Hardware

TSX-Plus is implemented on the PDP-11 series of computers manufactured by Digital Equipment Corporation. TSX-Plus uses the memory management hardware available on most DEC computers. Specifically, TSX-Plus may be used on the following computers: LSI-11/23, PDP-11/23-PLUS, LSI-11/73, MICRO/PDP-11, PDP-11/24, PDP-11/34a, PDP-11/44 and PDP-11/60. (TSX-Plus may not be used on LSI-11/2, PDP-11/03 or VAX computers.) Some older machines which support memory management may also use TSX-Plus. All of these computers support memory up to at least 256Kb. TSX-Plus requires at least 128Kb of memory. On the LSI-11 bus, the PDP-11/23-PLUS, LSI-11/73, and MICRO/PDP-11 support more than 256Kb of memory whereas the LSI-11/23 may support more than 256Kb of memory only if the backplane is configured for 22-bit addressing. The only Digital devices currently supported with 22-bit DMA addressing on the LSI-11 bus are those using the DL handler (RL01 and RL02), the DU handler (RA80, RC25, RD51, and RX50) and the MS handler (TSV05). All other DMA device handlers only support 18-bit addressing on the LSI-11 bus and therefore must use the TSX-Plus I/O mapping facility if the system has more than 256 K bytes of installed memory. On the Unibus, the PDP-11/24 and PDP-11/44 support more than 256Kb of memory with the necessary hardware. Although it is not impossible to use TSX-Plus on a system with only floppy disks, this configuration is highly discouraged due to the frequency with which information is shuttled back and forth from disks in the multi-user environment.

#### 3.2. Software

Although TSX-Plus completely replaces the RT-11 kernel during operation of TSX-Plus, it must be started from the RT-11 Single-Job or Baseline monitor. In addition, the necessary utilities and device handlers are provided with RT-11. TSX-Plus supports many of the keyboard commands of RT-11 Version 5, but it may be run with either RT-11 Version 4 or 5. Attempts to use features which require RT-11 Version 5 utilities will generate error messages when used with RT-11 Version 4 utilities. Both Logical Subset Disk and Single Line Editor features are separately implemented in the TSX-Plus kernel, they do not use the LD or SL handler, and are available whether TSX-Plus is used with either RT-11 Version 4 or 5.







#### 4. Do you need to perform a TSX-Plus system generation?

In order to tailor the features of TSX-Plus for your particular installation TSX-Plus is shipped as several program modules. The module named TSGEN.MAC is provided to allow special modification for the needs of your site. It contains all the parameters which are modifiable by TSX-Plus users and allows selective inclusion of various optional features of TSX-Plus. It also allows specification of the peripheral devices and terminals which are to be used by TSX-Plus. The short-cut method of installing TSX-Plus described later in this guide assumes certain system configurations which may be more or less suitable for your site. The short-cut installation makes the following assumptions:

1. The system disk is one of: RL01, RL02, RK06, RK07, RA80, RC25, RD51 or RK05.
2. You have a console terminal at the standard vector and address, and additional terminals are connected through DL(V)11 type interfaces. You must perform a TSX-Plus system generation in order to use DZ(V)11 type multiplexors. The vectors and CSR addresses for time-sharing terminal interfaces are assumed to be:

Line	Vector	Address	
---	-----	-----	
1	60	177560	(operator's console)
2	310	176510	
3	320	176520	

3. Your printer will be spooled (see the TSX-Plus Reference Manual for a discussion of printer spooling); will use the LP device handler; is attached through a LP(V)11 type interface; and is not configured at any of the vector/address combinations defined for time-sharing lines (see list above; the default LP CSR=177514 and vector=200).
5. You do not require any of the following optional features:

- Log-on or device access control.
- Generalized or shared file cache.
- Performance monitoring.
- Shared run-time systems.
- Virtual arrays or virtual overlays.

(The functions of these features are described in both the TSX-Plus Reference Manual and the TSX-Plus System Manager's Guide.)

6. You do not have or plan to use memory above 256Kb.

If your requirements differ from these, then it will be necessary for you to perform a complete TSX-Plus system generation procedure. The TSX-Plus System Manager's Guide describes the TSX-Plus system generation process. Note that the short-cut installation procedure does not copy from the distribution medium all of the files necessary for a complete system generation; if you need to perform a TSX-Plus system generation, copy all of the files from the distribution disk(s) to a working surface. In cases in which there are no hardware conflicts with the above restrictions, it may be useful to use the short-cut





installation method to verify the correct interaction of TSX-Plus with your hardware and to gain experience with the TSX-Plus system before selecting the parameters which must be specified in TSGEN.MAC for generation of the TSX-Plus system.





## 5. TSX-Plus Short-cut Installation Procedure

There are three simple steps to the short-cut installation procedure:

1) Assign the logical device name "IN" to the device containing the TSX-Plus distribution files. If your distribution was supplied on floppy diskette then files must be transferred from both sides of the diskette. The short-cut installation command file (MAKTSX.COM) will prompt you to replace the input volume (turn the diskette over) at the appropriate time. In the following examples, the unit number "n" refers to the unit containing the distribution medium.

If TSX-Plus was distributed on a floppy diskette:

.ASSIGN DYn IN

or

.ASSIGN DXn IN

If TSX-Plus was distributed on an RL01 or RL02 disk:

.ASSIGN DLn IN

If TSX-Plus was distributed on magnetic tape:

.ASSIGN MTn IN

or

.ASSIGN MSn IN

or

.ASSIGN MMn IN

2) Assign the logical device name "DK" to a working surface on which TSX-Plus will be assembled and linked. Approximately 1400 free blocks are necessary on the working surface; about 700 blocks for files copied from the distribution and about 700 blocks for files created during the installation process. For example:

.ASSIGN DL1 DK

The system disk also requires approximately 2000 free blocks to contain the executable TSX-Plus program, utilities, device handlers, job swapping and spool files.

These figures reflect the minimum total free space required. If insufficient free space is available, remove unnecessary files. If the free space is badly fragmented, it may be necessary to squeeze the fragmented surface.







- 3) Use the command file provided to copy, assemble, link and start TSX-Plus.

.@IN:MAKTSX

In order to install TSX-Plus, you must be booted from the RT-11 Version 4 or 5 Single-Job or Baseline monitor. The Foreground/Background and XM monitors do not leave enough room to run the TSX.SAV module and will report an error if you try to start TSX-Plus from them. (This is also true of some RT-11 Single-Job monitors which have been "sysgened" and include too many features, such as multi-terminal support; in this case, copy the original Single-Job monitor (RT11SJ.SYS) from your RT-11 distribution and boot it before running TSX-Plus.)

To reiterate the short-cut installation procedure:

- 5.1 Boot the RT-11 Single-Job or Baseline monitor. If you normally use either the Foreground/Background or XM monitor, type the following command:

.BOOT RT11SJ

- 5.2 Assign logical names to the device holding the TSX-Plus distribution files and to the device on which TSX-Plus will be built. For example:

.ASSIGN DX0 IN  
.ASSIGN DL1 DK

(DX and DL are examples, use the correct devices for your site.)

- 5.3 Prepare at least 2000 free blocks on the system disk, and 1400 free blocks on the work disk. You can verify the presence of the necessary free space with the DIRECTORY commands:

.DIR/FREE SY:  
.DIR/FREE DK:

- 5.4 Execute the command file (MAKTSX.COM) on the distribution medium which copies the necessary files to the system disk and to the working disk, builds, copies to the system disk and starts TSX-Plus.

.@IN:MAKTSX

This command file will prompt you to replace the input volume at the appropriate time. If you received TSX-Plus on a floppy diskette, then turn the diskette over at this time and type Y and then press the RETURN key. If you received TSX-Plus on a large disk or on magnetic tape, just type Y and enter a RETURN in response to this prompt.

In either case, when you are asked to replace the output volume, just type Y and press RETURN.





- 5.5 You should now be running TSX-Plus. At this point, a greeting message containing S&H's copyright notice and the date and time should appear on the operator's console. TSX-Plus is now ready to accept a command. The monitor prompt is a period (".").

The greeting message will appear on other terminals when they are on-line and a carriage return is typed on their keyboards.

If this short-cut installation does not succeed or if any errors are reported at any point in the process: review the requirements listed above for the short-cut installation process; review the common errors described in the next section; read the TSX-Plus System Manager's Guide before performing a TSX-Plus system generation for your system configuration.

- 5.6 Once TSX-Plus is successfully installed, you may subsequently start it, after booting the RT-11 Single-Job monitor, with the command:

.R TSX

- 5.7 You can verify the operation of TSX-Plus at any time while it is running by using the SYSTAT command to display the status of the system and all current time-sharing jobs. The SYSTAT command is described in the TSX-Plus Reference Manual, as are all other valid TSX-Plus commands. The SYSMON utility program may also be used to dynamically display system and job parameters. Use of the SYSMON program is described in Appendix E of the TSX-Plus System Manager's Guide. The SYSMON program may only be used with VT100 or VT52 type terminals.





## 6. TSX-Plus Installation and System Generation Hints

Whether using the short-cut installation process described here or using the complete system generation process described in the TSX-Plus System Manager's Guide, various types of errors can occur and be reported during the installation process. The errors discussed in this section are those most commonly encountered when first installing TSX-Plus. A complete listing of start-up error messages which may be reported by TSX-Plus are included in Appendix B of the TSX-Plus System Manager's Guide. Appendix C of the TSX-Plus System Manager's Guide lists those fatal system error messages which may be reported at any time during the operation of TSX-Plus; these are usually indicative of an unusual hardware condition. If an error is reported during start-up of TSX-Plus which is not described in those two appendices, it will have originated from RT-11 before TSX-Plus took control; see the RT-11 System Message Manual for descriptions of RT-11 error messages.

### Error message: ?PIP-F-Device full

There is not enough free space on the output disk to copy all distributed files. The system disk requires about 2000 free blocks: about 400 blocks for the executable files and handlers, about 1100 blocks for the swap file, and an additional 500 blocks for the spool file. The working disk requires about 1400 free blocks: about 700 blocks for distributed source and object files, and about 700 blocks for files created while generating TSX-Plus. Remove unnecessary files from the system and working disks and squeeze if necessary.

### Error message: ?KMON-F-Not enough memory (RT-11 V4)

?KMON-F-Insufficient memory (RT-11 V5)

The base of the monitor is too low to load the TSX.SAV program. Unload some resident device handlers and SET USR SWAP. TSX-Plus may not be started from the RT-11FB or RT-11XM monitors. The TSX.SAV program must be run from the RT-11 Single-Job or Baseline monitor which has NOT been "sysgen'ned" to include multi-terminal support. Copy the original RT-11 Single-Job monitor (RT11SJ.SYS) from your RT-11 distribution and boot it before running TSX-Plus.

### Error message: ?TSX-F-( \*\*\* error message displayed here \*\*\* )

See the TSX-Plus System Manager's Guide, Appendix B for descriptions and remedies for fatal errors which occur during start-up of TSX-Plus.

### No response from terminals:

The operator console is established with vector=60 and CSR=177560. This and all other time-sharing terminals must have their hardware interface vector and CSR address settings declared to TSX-Plus by parameters in the file TSGEN.MAC before assembling and linking the TSX-Plus system. Only DL(V)11 type interfaces are usable with the short-cut installation method; DZ(V)11 multiplexors require that you perform a TSX-Plus system generation. The short-cut installation process assumes that time-sharing lines are configured as follows:





TSX-Plus Line #	Vector	CSR
-----	-----	-----
1	60	177560
2	310	176510
3	320	176520

Error message: ?TSX-F-Fatal system error @nnnnnn  
 (EEE-error message displayed here)  
 Arg. value = xxxxxx  
 Seg. value = yyyyyy

The most common causes of this error are incorrect device vector and address specifications. If the vector is incorrect, the error message will be: "UEI-Interrupt occurred at unexpected location". If the address is incorrect, the error will be: "KTP-Kernel mode trap". Review the default time-sharing line vectors and addresses above. The only other devices declared to TSX-Plus in the short-cut installation method are the following:

Device	Vector	CSR
-----	-----	-----
DL	160	174400
DM	210	177440
DU	154	172150
DY	264	177170
LP	200	177514
NL	N/A	N/A
RK	220	177400

The vector and address assigned to the printer may be changed using the keyboard "SET" command after TSX-Plus has been started, but before printing anything; see the next paragraph. See the TSX-Plus System Manager's Guide, Appendix C for explanations of other fatal error messages.

Printer does not respond:

The interface hardware for the printer must correspond to the address specified in the device handler LP.TSX. If your printer is not at the default vector and address, then after starting TSX-Plus, but before printing anything, use the keyboard handler "SET" options to set the correct vector and address.

SET LP VECTOR=nnn  
 SET LP CSR=nnnnnn

The printer vector and address must not conflict with those defined for any time-sharing terminal line. After setting the correct vector and address in the LP.TSX file, reboot the system and restart TSX-Plus with the command:

.R TSX

